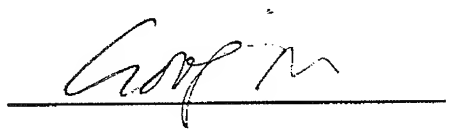
IN THE MATTER OF

U.S. Patent Application No. **10/765,954**

By Samsung Electronics Co., Ltd.

I, Soog-Jin LEE, an employee of Y.P. LEE, MOCK & PARTNERS of Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare that I am familiar with the Korean and English language and that I am the translator of the enclosed documents 1 to 9 for U.S. Application No. 10/765,954 and certify that the following is, to the best of my knowledge and belief, a true and correct translation

Signed this 8th day of June 2007



◈ In-Service Invention Report

<<The right to register the present invention related to a duty is assigned to the company based on Article 39, Paragraph 40 of the Korean Patent Law>>

◎ The present in-service invention is transmitted to DM Lab. Intellectual Property Team (Suwon)

◎ Title of the Invention: Structure 1 for reducing access time in write once recording apparatus

◎ Invention Classification: Self-Invented

◎ Inventors

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◎ In-Service Report Files

File Name	File Description
Structure 1 for reducing access time in write once recording apparatus.gul	Keep a temporary access start address area in order to reduce access time in a write-once recording apparatus

◎ Invention Evaluation

Subject of Evaluation		Date	Grade	Opinion
Inventor	Hwang Sung Hee	05 February 2003	S (strategy)	For suggesting a standard
Director	In Sik Park	05 February 2003	A	For suggesting a standard
Patent Department		06 February 2003	A	-
Evaluation Committee		19 August 2003	A	-

◎ In-Service Invention Progress Dates

Inventor's Report Date: 05 February 2003

Director's Approval Date: 05 February 2003

Patent Department Receipt Date: 06 February 2003

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◎ In-Service Invention Receipt No.: AA-200302-005-1

Summary of the Invention

Unlike a rewritable device, it is impossible to record new information on a portion of a write-once device. Accordingly, a new portion of the write-once device must be allotted to update the already recorded information. Therefore, an area of the write-once device is allotted according to a number of times of updating information and the size of the area where information is updated and the area is divided so that information may be recorded thereon whenever information is updated (in general, writing may be sequentially performed within the allotted area). If the area of information that is finally updated is unknown, data of the area is reproduced from the beginning and updated information must be found. If the size of the area is reduced, desired information can be fast detected but a number of times of updating information is limited.

In order to perform a defect management (DM) by a drive in a write-once device, a number of times of updating information is increased, since temporary disc definition structure which is information related to temporary DM and a temporary defect list should be updated when a disc is ejected from a driver. In addition, disc and drive information indicating state of a disc and a driver is updated.

The more information to be updated in a write-once device, the longer time is for obtaining recent information from a disc. In particular, this problem becomes more serious for a write-once disc, since whenever information is updated, the updated information is recorded at different portions of an area of the write-once device, unlike a rewritable device. Thus, the area where recent information of other area is stored is recorded on an area (area A) from among the areas of a write-once device and recent information of the area A is obtained so that information of the area where other recent information is detected, thereby reducing the time. In this structure, the area A is updated whenever other area is updated, or instants of time when updating information in all areas are regarded as the same so that after recording updated information in the other update areas, the information recorded in the update area *A*, which is updated, and position information on which update information in the other update areas is recorded are recorded in the update area A. Also, during a read operation, recent information of the area A is obtained so that position information on which recent information of other areas is recorded may be obtained to be used. For a user's convenience, a number of updating information is

preferably frequent. However, if the areas where recent information of the area A is not previously detected, the time for obtaining recent information of the area A becomes longer. Thus, the time for obtaining information limits a number of times of updating or the time itself may be a problem.

Therefore, in the present invention, whenever information of the area A is updated by a predetermined instant of time (previously set number of times or number of blocks), position information on which information at the instant of time is stored is recorded on a temporary access start address area (TASAA) which is a separate area. Accordingly, a method of obtaining recent information recorded on the area A is suggested, thereby providing a user's convenience.

Available areas: Lead_in, Lead_out, Write area

Drawings of the Invention

1. Location of temporary access start address area (TASAA) (In case of Lead_in)

. . .
TEMPORARY ACCESS START ADDRESS AREA (TASAA)
AREA A
AREA B
AREA C
RECORDING CONDITIONS TEST AREA
. . .

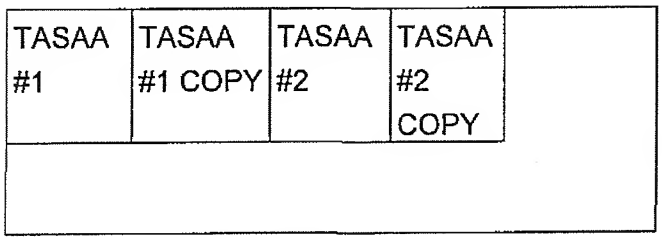
The TASAA is present in a lead-in area and a lead-out area and may be formed in two separate areas for robustness of information. An area A, area B, and area C are areas where updated information is recorded thereon and updated information may be all information updated not only in the lean-in area but also in other areas such as disc and drive information indicating state of a disc and a drive,

temporary disc definition structure (TDDS) of temporary defect management information for defect management by a driver, and a temporary defect list (TDFL).

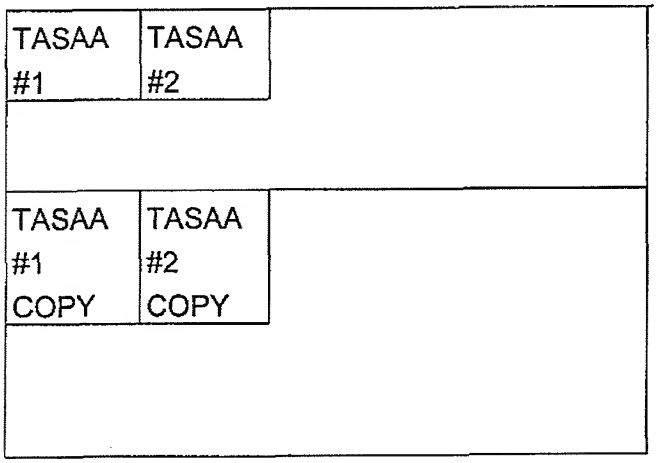
Since position information about recent information of other areas is recorded on the area A, whenever other areas are updated, the area A must be updated. In a worst-case scenario, if instants of time when updating are different from one another, a size of the area A is required to be the same as or larger than a sum of sizes of all other areas to be updated. To prevent such a problem, instants when updating the other update areas are preferably the same to minimize the size of the area A. Also, after recording recent information in the other update areas, the information recorded in the area A, which is updated, and position information regarding recent information of other areas may be recorded in the area A. Information is recorded in the area A after completing recording information in the area B, since a position of the recently updated information in the area B may change, after a position of recent information to be updated is pre-determined in the area B and the area A is updated beforehand and if an ECC error occurs in the area B after recording updated information in the update area B.

2. Structure of TASAA

2.1



2.2



For robustness of information, information may be repeatedly recorded as in FIGS. 2,1 and 2.2. Also, if the TASAA is present in the lead-in area and the lead-out area, information can be recorded once in a respective area. Also, information may be recorded starting from an end of the area to the beginning.

3. Contents of TASAA #n

TASAA identifier = "SA"
TASAA NUMBER
NUMBER OF POSITION INFORMATION
ACCESS STARTING POSITION INFORMATION OF AREA A
ACCESS STARTING POSITION INFORMATION OF AREA B
ACCESS STARTING POSITION INFORMATION OF AREA C
RECENT POSITION INFORMATION TO BE TESTED IN RECORDING CONDITION TEST AREA
. . .

When all updated information is needed, recent TASAA information is obtained so that access starting position information of the area A is obtained and

information recorded on the area A is reproduced from the position, thereby obtaining recent information of the area A. Also, position information on which recent information of other areas is recorded is obtained so that recent information of other areas is obtained. If only information of a specific area is needed, TASAA information is obtained so as to obtain access starting position information of the area needed. Then, recent information of the area is obtained from the position.

Operation of the Invention

For access time, the area A including access starting position information of recently updated information in other areas may preferably select the area having the smallest block unit, that is a unit of a error correcting code (ECC).

During a write operation, whenever the area A is updated by a predetermined instant of time (previously set number of times or number of blocks), access starting position information of other areas and the area A is recorded on the TASAA, or if a number of recording operations is small, a period of updating information recorded in the TASAA is determined to be short and if a number of recording operations is big, a period of updating information recorded in the TASAA is determined to be long. Accordingly, an instant of time when updating information recorded in TASAA is updated, may also be differently determined.

During a read operation, recent information of the TASAA is obtained by accessing the TASAA from a start so that access starting position information of other areas and the area A is obtained. Thus, desired recent information is obtained by accessing from the access starting position information.

When information is no longer recorded (when finalizing), regardless of the instant of time when updating information in the TASAA, position information of recent information in other areas and the area A is recorded on the TASAA.

Effect of the Invention

Assuming that ECC is performed in block units and reproduction time of a block is 1, recording is performed in block units that are also ECC units. Assuming

that a process until next update information is recorded after updated information is recorded on a specific area is an operation. When an operation is performed in the areas A, B, and C and as a result, the amount of information to be updated exceeds a block, the TASAA is very helpful. Thus, if the amount of information to be updated is a block according to the result of an operation, it is enough.

Instant of time when updating information in the TASAA: a number of operations of the area A, that is, information is updated whenever the number of times of updating information to be recorded on the area A is 30.

When the number of time of updating in the area A, that is, when the number of operations is 299, a time for obtaining desired information from the area A depends on whether the TASAA is present or not, as follows.

When the TASAA is present: 299/30 + 299%30 +1 = 9 + 29 +1 = 39.

When the TASAA is not present: 299.

In this case, the time for obtaining desired information from the area A is the same regardless of the inclusion of the TASAA, until a recording operation is performed thirty times. However, once a number of times of performing the recording operation is more than 30, a time required to reproduce information from twenty nine blocks can be saved when the recording operation is further performed thirty times.

In a table below, if the number of operations is 300 and 500, the longest access time required to obtain recent information of the area A, the average access time, and the size of the TASAA according to update timing of the TASAA are illustrated.

TIME OF UPDATING	0	10	20	30
LONGEST ACCESS TIME	300	39	34	39
AVERAGE ACCESS TIME	150.5	20.07	17.49	19.94
SIZE OF TASAA (BLOCK)	0	30	15	10

Table 1. when the largest number of operations is 300

TIME OF UPDATING	0	10	20	30
LONGEST ACCESS TIME	500	59	44	45
AVERAGE ACCESS TIME	250.5	30.08	22.51	23.15
SIZE OF TASAA (BLOCK)	0	50	25	17

Table 2. when the largest number of operations is 500

In the tables above, a time unit is the time required to reproduce a block.

As illustrated in the tables, large instants of time when updating information in the TSAA are not always helpful. An appropriate updating time should be detected according to an available number of operations. The appropriate updating time according to the available number of operations can be detected by considering the longest access time, the average access time, and the size of the TASAA.